

OBJ1110-8
1 OF 6

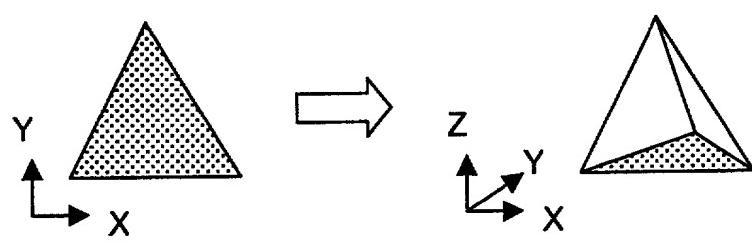


Fig. 1

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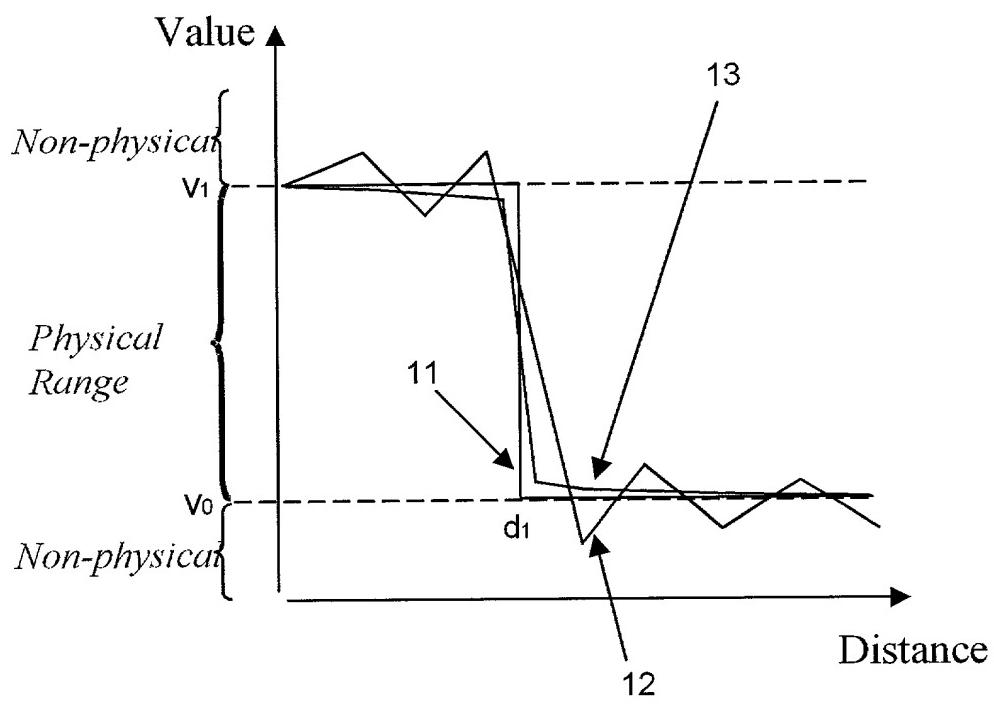


Fig. 2

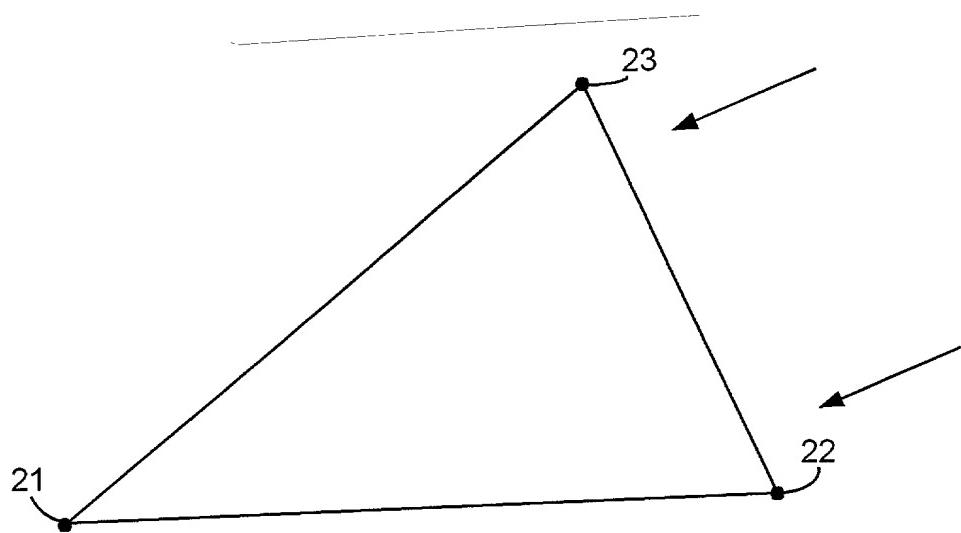


Fig. 3

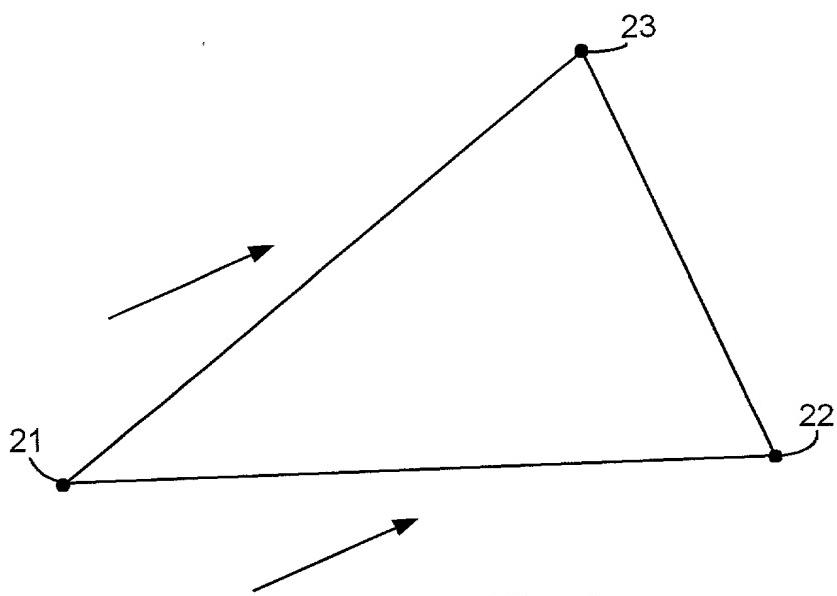


Fig. 4

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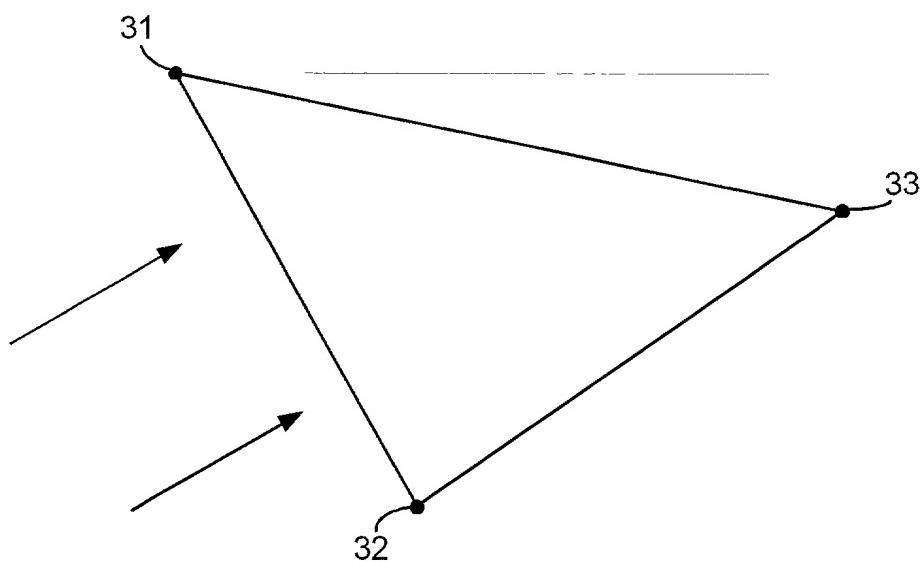


Fig. 5

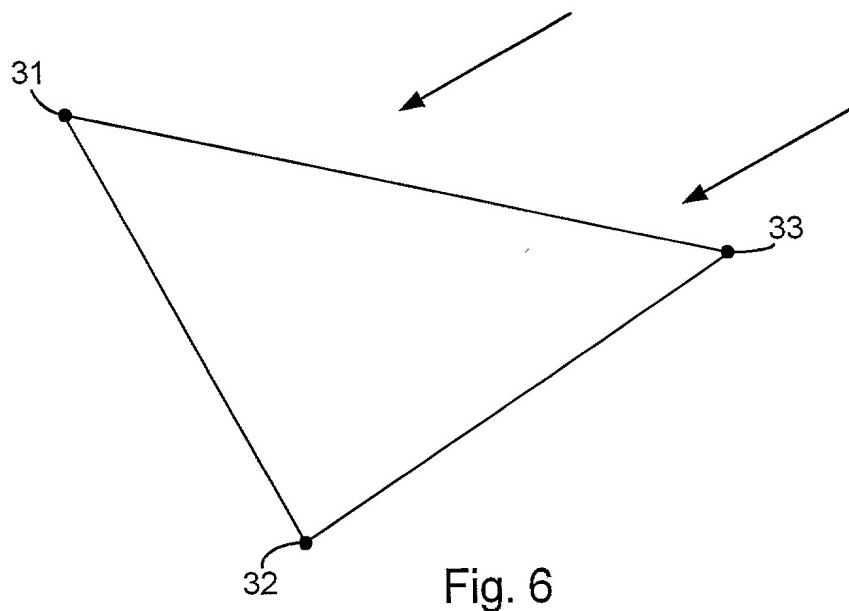


Fig. 6

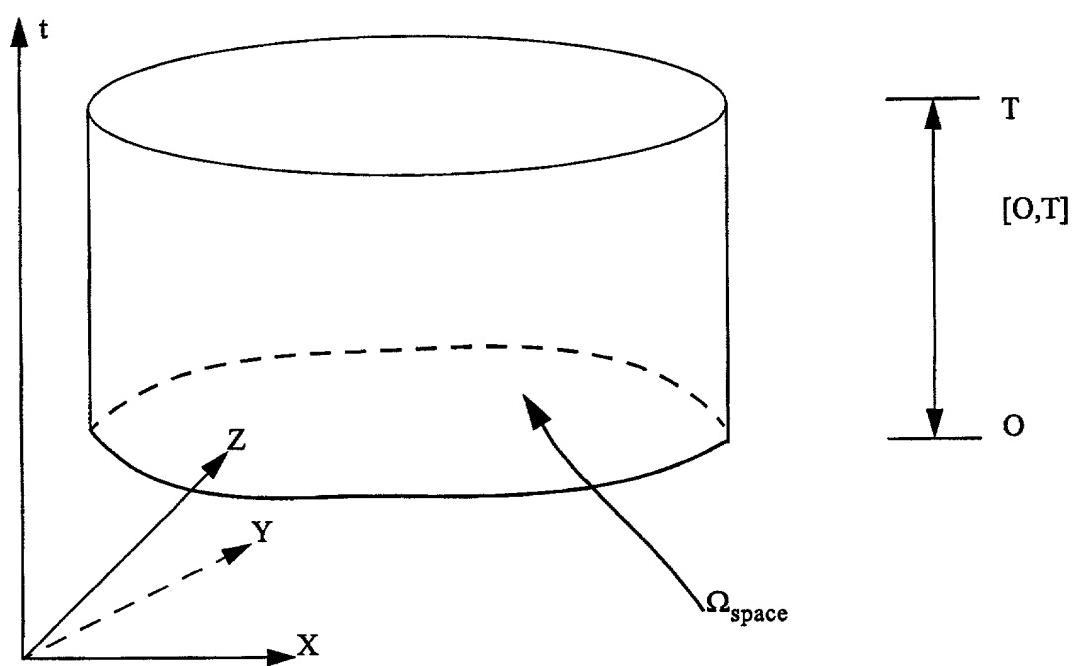


Fig. 7

Multi-Phase Flow

Compute K_j for each node of the 4-Tet,
 $j = 1, 2, 3, 4, 5$ Where:

$$K_j = - \int \nabla N_j \bullet K (\nabla P_i + \rho_i g \nabla Z) |_{\Omega_e} , j = 1, \dots, 5$$

Algorithm 1. To distribute residuals of the finite element operator: $(Y_j^i)_{\text{spatial}}$

Divide K_j into positive and negative values

$$K_j^+ = K_j \text{ if } K_j \geq 0, \text{ else } 0$$

$$K_j^- = K_j \text{ if } K_j < 0, \text{ else } 0$$

Distribute residual to the nodes according to

$$Y_j = K_j^+ \lambda_j + K_j^- \left(\frac{\sum_k K_k^+ \lambda_k}{\sum_k K_k^+} \right)$$

Compute tangent operator -

$$T_{jk} = \frac{\partial Y_j}{\partial (\lambda_k, P_k)}$$

Assemble system and solve.

Fig. 8